

App. F. IX-4

1945-46

File No. 18-6,5

Previous References.

(9.17

Serial Nos. 26, 34, 45, 58

Later References.

P.W. 1580 81 / 9.17 53 46-1

GENERAL AND REVENUE SECRETARIAT

Serial Nos. from

Part B for

Sept 1946

SUBJECT

visit of Mr J. L. Savage Chief Designing
Engineer, Bureau of Reclamation U.S.A.,
during 1945 46 to India

P W. 1580 1

6.5.46

530

The Chief Engineer for Irrigation

The Controller of Mysore

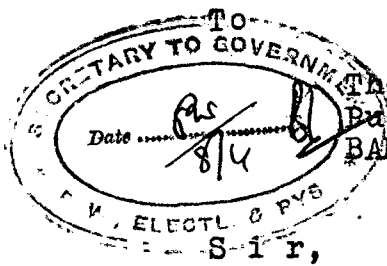
(thru 719

Sanctions the payment of Rs

18-45-26

No. 2134/5
Encl 3 original

Office of the Chief Engineer for
Irrigation in Mysore,
Dated, Bangalore, the 6th April 1946.



The Secretary to Government,
Public Works Department,
BANGALORE.

P. W. SECRETARIAT.

Date 11/4/46

Subject:- Visit of Dr. J. L. Savage, Chief
Designing Engineer, Bureau of
Reclamation, U.S.A., during 1945-
46 to India.

In continuation of this office D.O. letter No.P.C.
607 dated the 27th February 1945 requesting sanction of
Government and to arrange payment of Rs.95- 9-0 to Mr.
Ram Kishan Behl, Stenographer, Lahore, incurred in con-
nection with the visit of Dr.J.L. Savage, Chief Designing
Engineer, Bureau of Reclamation, U.S.A., I have the honour
to forward herewith letter No.14842/45 EG.4/44 dated the
13th March 1946 with its enclosures (in original) received
from the Secretary to Government, Public Works Department,
Irrigation Branch, Punjab, in regard to the expenditure
that has to be borne by the several Governments in India
in connection with the visit of Dr. Savage.

It is seen from the statement that a sum of Rs.3,018/-
is to be borne by Mysore Government.

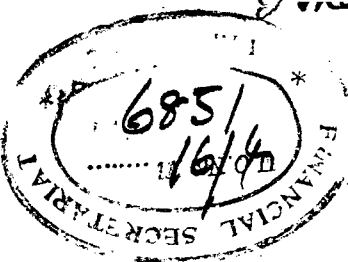
I request that sanction of Government may kindly be
obtained to the payment of Rs.3,018/- to the Secretary to
Government, Public Works Department, Irrigation Branch,
Punjab (Lahore), and the Comptroller of Mysore authorised
to arrange for the payment of the above amount very early.

The payment as at (A)
maybe said, as our share

I have the honour to be,
Sir,
Your most obedient Servant,

Chief Engineer for Irrigation.
Per.

Min P.W.
+
Dewan
Thr.
Fm Secy



There is nothing to indicate in the papers in this file
that we agreed to bear these charges.
None of these are any other papers my m/s should be
put up

Secy P.W. Dept

19/4 6) Ask C.E.I.
12/4

30/4
 1/5/46

Issue
Mar 3rd 16

10 P.H. 5006/EST 18-45-84 dated 13.5.46.
20 Dec 1946

Calls for certain particulars.

10/10/1944, 10/10/1944, 10/10/1944
10/10/1944, 10/10/1944, 10/10/1944
10/10/1944, 10/10/1944, 10/10/1944

[The page contains several lines of extremely faint, illegible text, likely bleed-through from the reverse side. A prominent diagonal line runs across the center of the page.]

(1) Is an improper verb (verb is not, then subject)

W. J. Smith
Master
No. 100

There is nothing to be done in the future in the
past. We are going to have a new world.

Post up

2000 - 2001

10/2/86

6130
P.W.

Cost of visit of
Mr. Savage.

File No.

of 194

Public Works
Secretariat

Serial
No.

14) The question of sharing the cost
of the visit of Mr. Savage has
not been raised at all

15) We may point this out and
however agree to pay should
the Govt. of India desire pay

B

25/6

Mr. P.W.) 16) Proposals as in para 4
& Devenam may be approved

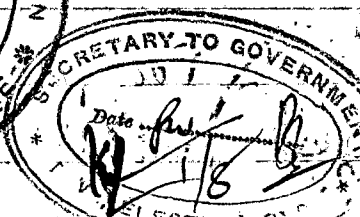
W/27/46

27/6

17) Maybe approved has
he given any reports
regarding this
The design of Rukku
valli project? If
so, it may be put
up

R. 29/6

18) C.E.T. W/1/46
etc.)

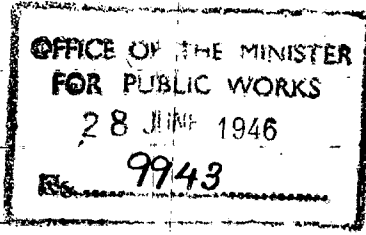


Returned with compliments.

19) The report of Mr. Savage in respect of the
Lakkavalli Dam is in the form of questions and answers,
a copy of which is herewith enclosed. These points
will be got examined by the Special Officer when appointed
vide D.O. No. C.23-25 dated 26-7-46 and action taken in
due course after consulting the alternative suggestions

Secretary to Government,
P. W. Department.

30/7/46



J. 18/8

Cont of visit of Mr. Savage.

Public Works
Secretariat

File No.

of 194

[App. F. III-2]

Serial
No.

20) Submitted with reference to the Minister's
Minute dated 29.6.1946 in para 17 of the
notes..

21) The report drawn up by Mr. Savage
is put up (Haf J.)

Submitted for perusal w/r to
the minute dated 29-6-46 vide
para 17. supra

Minister for
Public Works

KM 13 ⁸/_{ub}

⁸/_{13/8}

Dewan)

KM 16 ⁸/_{ub}

⁸/_{16/8}

HM
21/8.

KM 22 ⁸/_{ub}
⁸/_{22/8}

Subd with a drop.

⁸/_{27/8/46}

(secy) ⁸/_{28/8}

⁸/_{29/8/46}

Jonne
KM 31 ⁸/_{ub}

Encl Com 10) - Refce paras 14 & 15 before

8/9/46

21. 21/8

W
8/4

B
27.

W
1/14

May
11/9

OFFICE OF THE MINISTER
FOR PUBLIC WORKS
16 AUG. 1946

1294

DEWAN'S OFFICE

17. AUG. 1946

NO. 1325

GOVERNMENT OF HIS HIGHNESS THE MAHARAJA OF MYSORE.

General and Revenue Secretariat,

Dated Bangalore, 13.5.1946.

No. PH. 8006 / Ex. 18-45-34

FROM

The Secretary to the Government of His Highness the Maharaja of Mysore.
Public Works Department.

To

The Chief Engineer for Irrigation,
Bangalore.

CHIEF ENGINEER FOR IRRIGATION
NO. 3150
Dt. 17-5-46

Visit of Dr. J. I. Savage, Chief Designing Engineer,
Bureau of Reclamation, U.S.A. to Mysore State.

Sir,

With reference to your letter No. 2134/S dated 8th April 1946 requesting sanction to the payment of Rs. 3,018/- to the Secretary to Government, Public Works Department, ~~Public Works Department~~, Irrigation Branch, Punjab, towards the expenditure connected with Mr. Savage's visit to Mysore State, I am directed to request you kindly to intimate whether the payment of these charges had been agreed to by Mysore Government at any time.

I have the honour to be
Sir,
Your most obedient servant,

W. S. H. 11/5/46
Secretary to Government,
Public Works Department.

PK
pay please
17/5/46

Summ
14/5
17/5/46

all cons. file file
TSRN. 9
17/5/46
Sub with file
12/5/46

SUBJECT

10 4927

*Visit of Dr. J. L. Savage, Chief Designing Engineer,
Bureau of Reclamation, U.S.A. to Mysore State.*

Diary No. of letter replied to.....

Section *Eng.*File No. *18-45*Serial No. *34*

No.

P.W. 8006

To.

General and Revenue Secretariat

()
the 194

*The Chief Engineer for Irrig'n.
Bangalore*

Date of issue.....

*13.5.46**Sir,*

Signed by.....

[Signature]

*With reference to your letter
No. 2134/5 dated 8.4.1946 requesting
sanction to the payment of Rs. 3018/-
to the Secy. to Govt. P.W., Irrig'n. Br.
Punjab, towards the expenditure
connected with Mr. Savage's visit
to Mysore State, I am directed to
request you kindly to intimate
whether at any time the payment
of these charges had been agreed to
by Mysore Govt.
by *[Signature]* at any time*

List of enclosures.....

Copied by.....

Examined by.....

*I have etc.**[Signature]**Secy. to**P.W.*

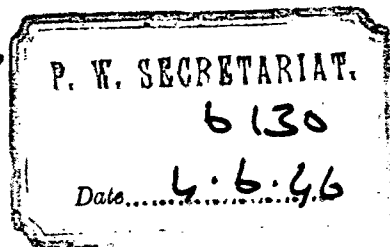
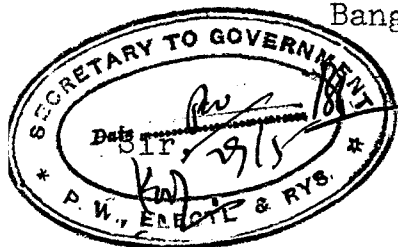
[Signature]
15/5/46

No 3255/S
Freedom Paper

20/18-45-45
OFFICE OF THE CHIEF ENGINEER
FOR IRRIGATION & CANALS
28-5-46

To

The Secretary to Government,
Public Works Department,
Bangalore.



Visit of Mr. Savage.

With reference to your letter No.P.W.8006/Est. 18-45-34 dated 13th May 1946, I have the honor to enclose for information of Government the original papers relating to the visit of Mr. Savage to Mysore. I see therefrom that the question of sharing the cost of Mr. Savage's visit has not been raised. But, in regard to the employment of a Steno-Typist, etc., the share of cost of such detail has been agreed to be accepted by the Mysore Government.

2. The enclosures may kindly be returned after done with.

I have the honour to be,
Sir,
Your most obedient servant,


Chief Engineer for Irrigation

LAKKIVALLI DAM ON BHADRA RIVER.

Question No.1.

"The project is a combined hydroelectric and irrigation scheme to develop 17,000 H.P.(13,000 K.W.) and to irrigate 180,000 acres. The annual water requirement for satisfying both the demands would be about 90,000 mc.ft., as against the inflow of 100,000 mc.ft. in a year of average rainfall. In years of bad rainfall, however, which generally occur twice in a cycle of 10 years, the inflow falls short of the demand to an extent of about 20,000 mc.ft., when irrigation interests suffer proportionately. Any effort to store water out of a good year for use in a bad year would make the scheme uneconomical.

"Would it, therefore, be advisable to combine the two interests, viz., Power and Irrigation?"

It is believed that the development of power during the irrigation season, or for say 6 months each year, will be a paying proposition if the power thus developed can be utilised for supplying a seasonal power demand, or a demand that can be operated part of the year and closed down part of the year, such as the following:-

- (a) Irrigation pumping on an area above or outside of the proposed project and from a separate water supply.
- (b) Manufacture of fertiliser by electrolytic methods

Probably the best use of the seasonal power will be for irrigation pumping in that the power demand will conform exactly with the power supply. However, it is believed that the utilisation of seasonal power for the manufacture of fertilizer might prove equally satisfactory. Such use of seasonal power is under consideration by at least one of the Provinces in India and by the National Resources Commission in China.

A 20 percent shortage once in five years (average) in an irrigation supply is not uncommon. However, it is suggested that further consideration be given to the development of holdover storage, or of additional storage, with a view to determining whether this shortage can be reduced at reasonable cost.

Conclusion.

It is believed advisable to make this

project

project a multipurpose project by developing both the irrigation and power resources, even if seasonal power does not bring the usual power revenues. In other words it would appear to be an economic waste if the power resources were left undeveloped.

Question No.2.

"The nature of rock available for founding the dam, both in the river bed and at the flanks, is ultrabasic chlorite schist with vertical laminae and mixed with quartz. The ultimate breaking load for the specimen cores tested is 20 to 30 times the maximum intensity of stress developed in the dam. The maximum height of dam above foundations at the deepest portion is 240 feet.

"Is the rock suited to found a high dam as this?"

The ultrabasic chlorite schist rock, which shows tested strengths of 20 to 30 times the maximum calculated stress developed by the dam, will furnish a satisfactory foundation, particularly if the dam is keyed well into the rock at the base. The open test pits on the right abutment indicate deep weathering and it is evident that deep excavations will be necessary on this and probably both abutments to reach satisfactory foundation rock. Consideration may, on this account, have to be given to other than concrete gravity abutment portions of dam. An embankment with reinforced concrete corewall may prove more economical for one or both abutments, however, the gravity type is preferable if not too costly.

Conclusion. The rock in the river channel is judged from surficial exposures and strength tests to be suitable for foundations of a dam of the height proposed. It is probable that suitable foundation rock will be found in the abutments but the depth to such rock will be considerable and it may be economical to ~~use~~ use some other type of dam on a portion of each abutment.

Question No.3.

"The dam is proposed to be constructed of stone masonry in surki mortar. It is designed to limit the intensity of maximum stress to 7 to 9 tons per square foot and to prevent all chances of developing tension at any joint. The pressure due to uplift has not been taken into account.

"Would you recommend a drainage gallery?"

It is

It is not considered advisable to construct a dam to this height (240) feet of masonry with surki mortar. Masonry with portland cement mortar would be a satisfactory type. However, it is my opinion that this important project should be constructed as the pioneer modern concrete high dam in Mysore State. A portland cement mill is in operation only 30 miles distant and a narrow gauge railroad originating close to this plant passes through the dam site. Enlargement of the cement mill is now under consideration. A standard gauge track could be placed on the widened present grade at relatively small cost, giving convenient transportation facilities. Also, granite rock suitable for crushed concrete aggregate is conveniently available. Therefore, conditions are favourable for concrete work and the project would give unusual opportunity for the training of engineers and artisans of all kinds.

Conclusion. The dam should be designed as a straight (with one angle) gravity dam and constructed of portland cement concrete or of rubble masonry with portland cement mortar. The concrete dam is preferable. Any gravity dam whether concrete or masonry constructed on foundations of either hard or soft rock, should be designed with allowance for uplift, and drainage should be provided to limit the uplift pressures.

Question No.4.

" There will be 3 sets of sluices in the body of the dam at the river portion, viz., (i) low level turbine sluices, (ii) high level turbine sluices, and (iii) irrigation sluices. The low level turbine sluices are proposed to work under heads varying from 120 ft. to 60 ft. and with corresponding variation in discharge from 1500 cusecs to 300 cusecs.

"Is it desirable to generate power under such variations?"

The desirability of developing power with discharges varying from 1500 to 300 cusecs and heads varying from 120 feet to 60 feet is entirely dependent on the use to which such power can be put. As stated above, it is believed that the best use may be that of irrigation pumping. In a country where famine conditions are recurrent and where the population is so great, it appears axiomatic that more irrigation is needed even if the financial returns are disappointing..

In any event the designs should include the power development and power outlets should be installed (or openings left therefor) in constructing the dam.

Conclusion. It is believed advisable to make this project a multipurpose project by developing both the irrigation and power resources, even if seasonal power does not bring the usual power revenues. In other words it would appear to be an economic waste if the power resources were left undeveloped.

Question No.5.

"The maximum discharge is calculated from the unprecedented floods of 1924 is 94,500 cusecs and provision is made in the dam for a flood disposal of 120,000 cusecs. The floods are proposed to be passed through the under sluices and automatic sluices provided in the body of the dam at a saddle on the left bank.

"The differences in level between the sill of under sluices and the river bed at the place where the draft channel joins the river is 117 feet and this has to be negotiated in a length of about $1\frac{1}{4}$ miles. It is proposed to give a series of drops in the draft channel and confine the entire flow in full cutting to avoid training banks. The drop walls are designed for water pressure and are provided with the necessary protective works. The total cost of the draft channel is estimated to be Rs.25.00 lakhs.

"Is there a more economical and safer method for the disposal of floods?"

It is common practice in America and in many other countries (and usually economical) to pass flood waters over the river channel section of a concrete gravity dam. I am certain that such construction will prove to be the most economical way to pass floods at this dam. While radial gates or stoney gates are more economical than drum gates, the latter type is preferable in many ways. This type is operated by valves utilising the reservoir pressure and the gates are easily made automatic by a simple and dependable compensating action between reservoir level as determined by a float in the float well and movement of the gate. Also, the drum gate is an overflow type that permits easy and complete aeration of the overflowing water. This is important as it prevents covitation by providing air to fill cavities as they tend to form. The drum gate is better adopted to the passing of floating trash than

than any of the under-flow types of gate and therefore it is safe against plugging by islands of trash.

An overflow dam must be protected against scour by means of a hydraulic jump apron or basin, or by a spillway bucket, or other structure suitable for dissipating the energy. Careful study of this feature will be necessary to determine the structure best suited hydraulically and from the standpoint of economy.

Conclusion. A more economical and probably a safer method of flood disposal is embodied in the proposal described above in which the flood waters are passed over the river channel portion of a concrete gravity dam and the energy dissipated by means of a hydraulic jump apron or basin or by a spillway bucket.

Question No. 6.

"The right bank canal is proposed to be taken to the Sulekere valley (which commands a vast extent of fertile lands) by means of a tunnel 3 miles long through the Ubreni Range of hills.

"The tunnel is given a curved top section with an air space of 1 ft. above the full supply level. The softer portions in the tunnel length will be lined with stone masonry and the length where hard rock will be met with will be treated with a 6" concrete lining.

"The tunnel has a bed fall of $10\frac{1}{2}$ ft. per mile and the maximum velocity developed is $11\frac{1}{4}$ ft. per second.

"Is the section of the tunnel now adopted suitable and economical?"

The section of tunnel, although unusual when judged by sections used for similar projects in America, is well adapted to conditions prevailing in India. There is no question that the masonry lining will withstand the $11\frac{1}{4}$ feet per second velocity and that it will support the load involved at this site. The 6 inch concrete lining proposed for reaches where hard rock is encountered would be considered unusually low as an average thickness but the small labour costs will, of course, permit the necessary chipping of rock surfaces to keep this average thickness low. If the rock does not break too badly the 6 inch average thickness may be

realised. If the rock does break badly the 6 inch thickness is likely to be increased by a few inches. The free board of 12 inches at maximum capacity is about the same as commonly used in America. The realisation of this freeboard will depend on the value of Butter's n used in designing the section of tunnel. The authority generally followed in the Western Continent is Mr. Fred C. Scobey of the U.S. Department of Agriculture. The original bulletins prepared by him give values applicable to structures similar to the proposed tunnel as follows:-

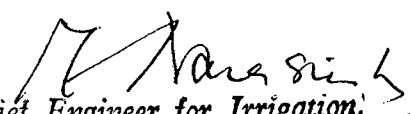
- $n=0.014$; excellent value for conservatively designed structures of wood, painted metal, or concrete under usual conditions; cares for alignment about equal in curve and tangent length; conforms to surfaces as left by smooth-jointed forms or well-broomed shot concrete; will care for slight algal growth or slight deposits of silt or slight deterioration.
- $n=0.015$; rough, plank flumes of unsurfaced lumber with curves made by short length, angular shifts; for metal flumes with shallow compression member projecting into section but otherwise of class $n=0.013$; for construction with first class sides but roughly troweled bottom or for class $n=0.014$ construction with noticeable silt or gravel deposits; value suitable for use with muddy water for either poured or shot concrete; smooth concrete that is seasonally roughened by larvae or algal growths take value of $n=0.015$ or higher; lowest value for highest class-rubble and concrete combination.
- $n=0.016$; for lining made with rough board forms conveying clear water with small amount of debris; class $n=0.014$ linings with reasonably heavy algal; or maximum larvae growth; or large amounts of cobble detritus; or old linings repaired with thin cement mortar coat; or heavy lime encrustations; earth channels in best possible conditions, with slight deposit of silt, free of moss and nearly straight alignment; true to grade and section; not to be used for design.
- $n=0.017$; for clear water on first-class bottom and excellent rubble sides or smooth rock bottom and wooden plank sides; roughly coated, poured lining with uneven expansion joints, basic value for shot concrete against smoothly trimmed earth base; such a surface is distinctly rough and will scratch hand; undulations of the order of 1 inch.
- $n=0.018$; about the upper limit for concrete construction in any workable condition; very rough concrete with sharp curves and deposits of gravel and moss; minimum design value for uniform rubble, or concrete sides and natural channel bed; for volcanic ash soils with no vegetation; minimum value for large high-class canals in very fine silt.
- $n=0.020$; for turburculated iron; ruined masonry; well-constructed canals in firm earth or fine packed

gravel where velocities are such that the silt may fill the interstices in the gravel; alignment straight, banks clean; large canals of class 0.0228.

Conclusion.

The adopted tunnel section is believed to be suitable and economical for conditions existing in India.

.....


Chief Engineer for Irrigation,
Mysore P. W. D.

Proceedings of the Government of His Highness
the Maharaja of Mysore.

R e a d -

Correspondence ending with U.O.Note No.259/S dated 30th July 1946 from the Chief Engineer for Irrigation, requesting sanction to the payment of Rs.3,018/- (Three thousand and eighteen only) to the Secretary to Government, Public Works Department, Irrigation Branch, Punjab (Lahore) being the Mysore Government share of cost in connection with the visit of Mr.J.L.Savage, Consulting Engineer, Bureau of Reclamation, U.S.A. to Mysore State.

Order thereon No.P.W. 1580-1 / *Est. 18-45-58.* Dated, Bangalore, 6th Sept. 1946

Sanctioned, the cost being met by re-appropriation of sanctioned grants under "23 Irrigation".

2. The Comptroller is requested to arrange for the payment of the amount to the Secretary to Government, P.W.Department, Irrigation Branch, Punjab (Lahore) after adjusting the sum of Rs.95-6-0, the payment of which was authorised in G.O.No.P.W. 5032-33 dated 14th March 1945.

B. Maubau
Secretary to Government,
Public Works Department.
ch

To

The Chief Engineer for Irrigation, with his office file and other enclosures.

h. w.
The Comptroller to Government (through the Fl.Sectt)
TSRN.

SUBJECT.....

Loss of visit of Mr. Savage.

Diary No. of letter replied to

General and Revenue Secretariat

the

19

Section *2-4*

File No. 18-45

Serial No. 58

Proceedings of the Government of
His Highness the Maharaja of Mysore.

Date of issue..... *5-3* 1946.

Signed by.....

Mr. BORN

May this be—

- (i) printed?
- (ii) treated as a standing order?
- (iii) published in the Gazette,
English Part?
- (iv) translated?
- (v) placed at the disposal of the Press?
- (vi) published in the Gazette,
Kannada Part?

Read—

*Correspondence ending with
letter no 259/s dated
30-7-1946 from the Chief Engineer
for Singatim, requesting sanction
to the payment of Rs 3018/-
(Three thousand and eighteen only) to
the Secretary to Govt. P.W. Dept.,
Singatim Branch, Punjab (India)
being the Mysore Govt. share of cost
in connection with the visit of Mr. J.
Savage, Consulting Engineer,
Bureau of Reclamation, U.S.A
to Mysore State.*

Order then No P.W. 1580-1 Dated 6.9.46

Sanctioned, the cost

*YSBH
2/11*

being met by re-appropriation
of sanctioned grants under "23 Indira".

2. The Comptroller is requested to
arrange for the payment of the amount
to the Secy to Govt., P.W. Dept., Indira Park,
Punjab (Lahore) after adjusting the sum of
Rs. 95-6-0, the payment of which was authorized
in G.O. No. P.W. 5032-33 D 143-1945.

W/31⁸46
Secy to Govt.
P.W. Dept.

For the approval
of the Secy to Govt.
27/8/46
W/31⁸46

20

The C.E. for Indira Park with his Mr. N. and other employees.

The Comptroller - Punjab H. Sect

B
27/8/46

Secy

27/8/46

List of Enclosures

note the adjustment suggested
is in regard to the sum of Rs 95-6-0 already
paid to the P.W. Dept. ^{Mr. Ram Kishan Behl.} account
the Comptroller's Enquiry during his
visit to Lahore -

Secy
27/8/46

Copied by

Examined by